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THE DOMESTIC BUFFALO*

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Buffaloes are indigenous in Asia and Africa. In the former continent they have been domesticated since the Dark Ages at least, and they are still extensively farmed in Southern Asia and parts of the Mediterranean region of Europe. It is surprising, therefore, that so little attention has been paid to them in veterinary and agricultural literature except, perhaps, to recommend clearing them out of an area and replacing them with other cattle in the course of livestock improvement schemes.

It is certain, however, that in some parts of the world buffaloes, and buffaloes alone, can yield an economic return from pasture on which no other domestic animal would thrive. They are not kept from ignorance of the possibilities of other cattle, but because, under certain circumstances, they are superior to other cattle. The purpose of this paper is to give a brief review of the " natural history " of the buffalo, which in itself may give support to these assertions.

ZOOLOGICAL CLASSIFICATION

A. Genus

It has been customary (see Lydekker[1]) to include all the members of the sub-family *Bovinae* in one genus—*Bos*. Further differences are recognised by the creation of sub-genera.

(1) *Bos* ... oxen.
(2) *Bibos* ... selandang, gaur, gayal and bantang.
(3) *Poephagus* yak.
(4) *Bison* ... bison.
(5) *Bubalus*... buffalo.

Though the subdivisions were based on such characteristics as shape of the horns, growth and distribution of hair, and obvious anatomical features as number of vertebrae, the differences between *Bubalus* and the other four groups were recognised as greater than between these themselves. In the buffalo the horns are triangular on section, are curved outwards and back, and are marked with transverse grooves on the anterior surface for most of their length. The growth of hair is sparse, and has no tendency to curl. In the other groups the horns are circular or oval in section, are curved outward and forward, and are completely ringed, but only at the base. The hair is close-growing and inclined to curl.

Nevertheless, the original implication of the term " genus " was a group of animals capable of breeding together but incapable of breeding with others outside the group ; and marked anatomical differences would not constitute grounds for the consideration of *Bubalus* as a separate genus. But *Bibos*, *Poephagus* and *Bison* have all been bred with *Bos* (Crew[2]), while buffaloes have not yet been bred with any of these sub-genera, and there is good reason to believe that they cannot do so. They should therefore be regarded as a separate genus. For this genus the name *Buffelus* is preferable to " *Bubalus*," as " *Bubalus* " has been used for the hartebeeste, and confusion might arise from its use for the buffalo as well.

In common parlance, this classification implies that buffaloes are not so closely related to oxen as asses to horses, or goats to sheep. This difference is reflected in the normal habitat and mode of life of buffalo. They are confined to the tropical and warm temperate zones and are to some extent aquatic, since they require more water than is needed for drinking. The other *Bovinae* are creatures of the dry grassy plains.

B. Species

There are two main sub-divisions of the genus, *B. africanus* and *B. asiaticus*. No cross-breeding experiments have been done to establish the difference as truly one of species, but the anatomical evidence is circumstantial. In the African buffalo the horns are enlarged at the roots, covering the forehead wholly or partially ; they taper sharply at the base, and gradually at the distal end, giving them a " trumpet shape." The horns of the Asiatic buffalo are not enlarged at the base, so that the forehead is not protected ; the taper is gradual throughout. They are generally crescentic. The Asiatic buffalo invariably possesses a crest which is absent in the African species. The posterior nares of the African buffalo is a single chamber as in the ox, but that of the Asiatic buffalo is divided throughout.

Various minor differences have been described in *B. africanus*, most of which amount to less than breed differences in domestic cattle. This species has not been domesticated.

Wild Asiatic Buffaloes.—There are several variants of *B. asiaticus*, the best known being the Arni, Indian Buffalo, Water Buffalo, or Carabao. It stands between four and five feet high, and the horns are crescentic above and behind the head. The forehead is unprotected. The hair is coarse and sparse, and that on the

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medial line of the neck and shoulders is thrown forwards forming a vestigial crest or mane. Three smaller types worthy of mention are the Dwarf Buffalo of Borneo, the Anoa of the Celebes Islands, and the Tamarao of the Philippine Islands.

Domestic Buffaloes.—Domestic buffaloes are usually described as a " domesticated or degenerate species or type of the Arni or Indian buffalo." It seems strange, however, that so few writers have pointed out the very wide difference between the domesticated " swamp " buffalo, which is practically identical with the wild arni, and the domesticated " river " buffalo which has no wild prototype.

The Swamp Buffalo (*Buffelus asiaticus* (*paludestris*)). —This animal has a relatively short body with a large girth, short thin legs, and a short face ; there is a small " shoulder hump " extending over the first eleven thoracic vertebrae and then terminating fairly abruptly ; the horns grow out horizontally in the young animal and curl up in a semi-circle as age advances, but they always remain approximately in the same plane as the forehead. These horns are uniform in length and shape ; *i.e.*, all swamp buffaloes of same age have approximately the same length and shape of horn. Domestic swamp buffaloes will mate with wild arni and produce fertile offspring.

The River Buffalo (*Buffelus asiaticus* (*riparius*)). This animal has a relatively longer body, and a smaller girth than the swamp buffalo, with longer, thicker legs, and a longer face ; the hump or dorsal ridge extends over the whole thoracic region, terminating gradually, and it is visible only in thin animals ; the horns are, at first, directed downwards and backwards, thus showing the domed shape of the forehead, but sooner or later they curl upwards in a spiral with their long axes horizontal : thus the forehead and any part of the horn are never in the same plane ; the length of the horn and its final shape vary in the different breeds. It can be noted that the spiral horn is heteronymous, *i.e.*, it is the left horn that has a right or corkscrew twist instead of the right horn as in African buffaloes.

There is very little evidence on the possibility of interbreeding between swamp and river buffaloes, but it is probable that crossing does occur, if only rarely. The two types, therefore, are almost certainly of the same species. Critical examination of the anatomical differences leads to the same conclusion.

Of the greatest importance is the difference in habit of the two types. The swamp buffalo is a more or less permanent denizen of marsh land, where it wallows in mud and feeds on the coarse marsh grass and reeds. The river buffalo is found more on dry ground. It appears to dislike mud and uses, where possible, rivers or ponds with firm bottoms in which to bathe. The two types are not miscible—a fact of considerable importance in the introduction of stud bulls for stock improvement. A river bull introduced into a herd of swamp buffaloes will be useless.

More attention has been paid to the selection of the river-type buffalo, which is therefore the type to be preferred if the country is equally suitable for either. As would be expected, with the improvement of the river type stock, breeds have grown up, with advantages for the country in which they were developed.

The best-known of these breeds are the following :—

(1) *Murrah* (Punjab). Short curled horns. A general purpose animal suitable for milk or work.

(2) *Jaffrabarri* (West India). Horns run down beside head in front of the ears. A heavy work animal, with poor milk capacity.

(3) *Mehsana and Surti* (Bombay Presidency). Short horns, curled only to a semi-circle. A good milch animal, poor worker.

(4) *Mediterranean.* Short horns. In northern climates a robe of hair is grown on the shoulders.

(5) *Rumanian.* A dwarf version of the Mediterranean.

All the Indian breeds can easily be crossed and there is no reason to believe that this is not true of the Indian and Mediterranean, though the cross has not yet been made.

Domestic buffaloes are widely used at the present day in India, Burma, South China, Thailand, Malaya, Ceylon and the South Sea Islands. They have been tried in Australia, but were not a success and were allowed to revert to their wild state. The Mediterranean group is best represented in Egypt ; in Southern Italy the numbers kept are decreasing.

NOTES ON ANATOMY AND PHYSIOLOGY

A. Skeleton

The skull is broader and thicker (but shorter) than that of the ox. There is no frontal eminence, though the inter-cornual region rises in a dome shape. In structure the skull resembles that of the sheep. The occipital bone stretches forward on the roof of the cranium. The parietals are large, constituting the greater part of the roof and containing a considerable part of the frontal sinus. Laterally the face converges to give a nasal region much as in the ox. The nasal cavity is divided throughout its length (*B. asiaticus*).

The vertebral column resembles that of the ox except in respect of the thoracic spines. In swamp buffaloes the 4th and 5th are longest, the length decreasing rapidly to the 11th. The peak is found at the same place in the river buffalo, but the length falls more gradually to the 13th.

The ribs are broad to within a few inches of their vertebral attachment. The scapula provides the only other feature of dissimilarity. It has a convex anterior and a concave posterior border, as in the horse. The junction with the cartilage at the posterior edge shows a distinct notch. The acromium arises at an angle of 60° instead of 80 to 90°.

B. Musculature and Fat

Lydekker[3] has differentiated between buffalo and ox beef in respect of their histology. The histological differences appear slight, however, and the macroscopical appearance is without doubt a sufficient guide to the identification of the two kinds of meat. Buffalo beef has a bluish tinge ; the fat is pure white, firm in consistence, and is small in quantity both inter- and intramuscularly.

Work.—The usual statement that buffaloes are stronger than oxen should be qualified. In Europe, where large and strong oxen compete with comparatively small river buffaloes it is definitely untrue. In Asia the zebu tend to run light, even when well farmed, while buffaloes, without attention, become heavy and muscular. In these countries a swamp buffalo can draw a cart loaded to well over a ton, while a river buffalo can probably do even better. Asiatic zebus, working as a

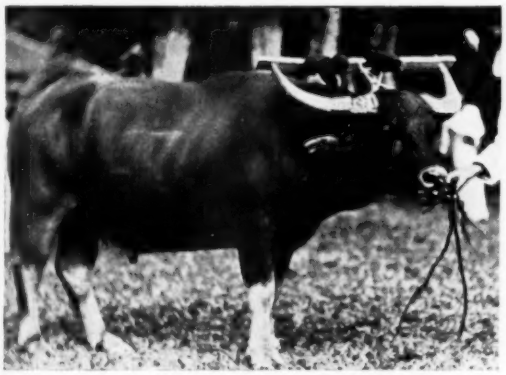
AFRICAN BUFFALO

CAPE BUFFALO BULL
(The shield of the forehead has been worn flat by rubbing against the walls of the pen.)

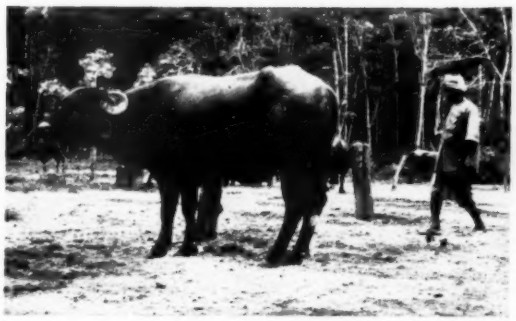
WILD INDIAN BUFFALO

ASSAM VARIETY OR BREED

DOMESTIC BUFFALOES



SWAMP BUFFALO BULL



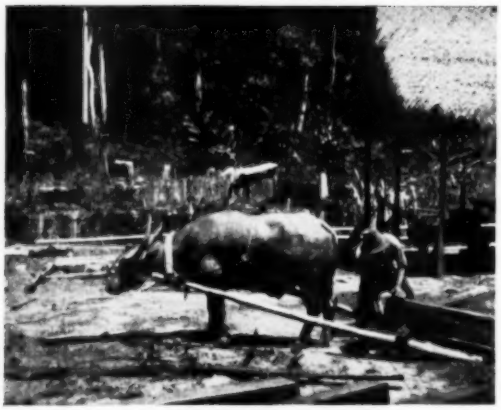
RIVER BUFFALO BULL: DELHI OR MURRAH BUFFALO

SWAMP BUFFALOES IN QUAGMIRE

RIVER BUFFALOES IN POND

Selected from 69 illustrations accompanying the original thesis.

SWAMP BUFFALOES AT WORK



TIMBER HAULING

PREPARING SWAMP FOR RICE PLANTING
The swamp flooded and the reeds being trampled.

PUDDLING CLAY FOR BRICKS

TURNING A SUGAR CANE MILL

MILKING

SWAMP BUFFALO CALF SUCKING

MILKING A SWAMP BUFFALO

pair, can draw only three-quarters of a ton, and are of no use on a dead weight. The advantage in using zebus for carting lies in their speed, for they normally move at four miles per hour, and can be urged on to six, while buffaloes normally move at only two miles per hour and cannot, under load, be urged faster though they will maintain this pace over very rough country.

C. Cutaneous System

The skin of the normal swamp buffalo is grey at birth but becomes slate blue later; that of the river buffalo is black throughout life; but in both types uncoloured patches occur in the groin, axilla and under the throat. Albino swamp buffaloes form about 5 per cent. of the herds, the fault never extending to the eyes as in other animals. Piebalds are also seen. Neither complete albinism nor piebald marking is seen in river buffaloes, but pale yellow-grey colouring occurs fairly often.

Hair.—All Asiatic buffaloes are born with a thick coat of long hair, a foot or more in length, covering the whole body, a fact that seems to indicate that they took to the rivers and swamps only late in their evolution. Early in life, most of it is replaced by a shorter growth an inch or two in length, but a few long cat hairs remain under the chin, throat and belly, and a feather of varying length remains at the end on the tail; there are no frontal curls as in the ox and bison. When the animal becomes adult, the hair growth is sparse, the skin being clearly visible beneath; in an old animal the hairs on the back may be fully an inch apart. In some male animals a scanty robe of hair forms over the forequarters as they become adult, but this is never thick enough to give any warmth, though it is normal in the European and rare in the tropical buffalo. It is interesting to note that this robe over the forequarters is best developed in the bison, another animal addicted to wallowing. Oxen never wallow, though they will stand in water if the weather is hot, and they never develop a robe.

The hairs as a whole stream back and downwards, but along the top of the neck they are erect or inclined forwards, forming a small crest. Over the shoulder blades or ribs one or two large whorls are usually found and smaller whorls may occur on the face, behind the stifle joints, or over the lumbar vertebrae. The hair of a "forward" whorl, that is a whorl in which the upper portion of the circumference streams forwards, lies flat on the body, and these forward whorls are commonest in the swamp buffalo. The hair of a reversed whorl, the commonest in the river buffalo, tends to be erect. The position, shape and size of the whorls differ in each animal and, as they are clearly visible throughout life and never alter, they provide an infallible means of identifying an individual. The colour of the hair as a rule follows that of the skin; that is to say, most river buffaloes are black throughout life, and swamp buffaloes are grey up to about five years old after which the hair becomes sparser and darker, and the animal gradually becomes blue-black, the face, legs and abdomen retaining their grey hairs for a few years longer than the rest of the body.

Hoof and Horn.—The hoof is rather larger and more rounded than the hoof of an ox. The horns appear at five days old but thereafter vary in growth according to type and breed. In the adult swamp buffalo the horn is peculiarly well adapted for clearing a way through the undergrowth, for digging up ground to form a mud bath, and for scratching off leeches which abound in the swamps, but it happens to be a source of grave danger to the animal's owner. A swamp buffalo, swinging round its head to scratch its flank, may quite easily drive its horn through a man's body, should he be standing at its side. Such injuries, however, are always inflicted unintentionally, and they can be avoided if a bar of wood is fastened over the tips of the horns when the animal is to be handled. Polled swamp buffaloes occur but are very rare. In river buffaloes the horns are generally useless, and comparatively harmless, as they are too close to the body to be a potential source of danger. In the curled horn Murrah breed the horns are apt to be a nuisance, as the animals sometimes interlock them in play and are then unable to separate until helped by their owner. The colour of horn and hoof in general follows that of the hair.

D. Circulatory and Respiratory Systems

The heart of the buffalo is relatively smaller than that of the ox, but is otherwise identical. The spleen is about the same length as in the ox, but is wider from side to side and more rectangular in outline. It is flatter and has only a small eminence on the parietal surface.

The blood counts are as follows:—

Erythrocytes	...	5,362,000 to 5,760,000
Leucocytes ...	...	8,900 „ 15,200
Polymorphonuclears		22·4 to 32 per cent.
Eosinophils...	...	8·3 „ 22 „
Mast cells ...	...	0·2 per cent.
Large mononuclears		8 „ 9 „
Small „		39 „ 66 „

The pulse of a cool animal is about 40 per minute, and the normal temperature 98·8°, but both vary considerably with atmospheric temperature. On hot days it is not at all uncommon to find temperatures of 104° in healthy buffaloes that are showing no signs of distress.

The lungs of the buffalo are more rounded and relatively smaller than those of the ox, except in certain breeds of river buffalo that have been selected for a large thoracic cavity to improve them for work. In the right lung the anterior portion of the cardiac lobe is triangular and clearly separated from the posterior portion which is adherent to the diaphragmatic lobe and marked off from it only by a small notch. The left lung shows no peculiarities. A cool resting buffalo breathes at the rate of 16 to the minute, under atmospheric conditions in which oxen are breathing at 20 to 25.

The nasal cavity is completely divided throughout its length by the long and wide vomer bone. The trachea has no dorsal ridge as the ends of the cartilages overlap like those of the horse. The larynx is very small and the voice correspondingly weak.

E. Digestive System

The teeth of the buffalo are similar to those of the ox, but are as a whole somewhat later in eruption. The table over-leaf gives the average of 18 buffaloes, of both river and swamp, there being no appreciable difference between them in this respect. Eruption was considered to have occurred when the whole of

the upper edge of the tooth was visible. No teeth were visible at birth.

		Temporary.	*Permanent.*
Incisors	1.	3 to 7 days	2 years 9 months
	2.	4 „ 7 „	3 „ 9 „
	3.	9 „ 14 „	4 „
	4.	4 „ 6 months	4 „ 9 „ to 5 years
Premolars	1.	4 to 7 days	2 years 10 months
	2.	5 „ 8 „	3 „ 11 „
	3.	4 „ 7 „	4 „
Molars	1.		1 year to months
	2.		1 „ 5 „
	3.		2 „ 8 „

The tongue of the buffalo is shorter, flatter and less pointed than that of the ox, and the dorsal prominence is less marked. The upper surface, the margins of the lower surface and the inside of the cheeks are blue in colour, except in albinos. The lingual papillae are soft and short, so that the tongue feels smooth to the touch. The ridges of the palate are not prominent and do not interlock in mid line.

The rumen and reticulum of the river buffalo usually have a very dark green, almost black, lining due to deposits of melanin just beneath the stratum corneum. In the swamp buffalo the lining is not so dark. Albino and piebald buffaloes nearly always have pale rumens. The coloration of the rumen is concentrated in the papillae, but in the reticulum it is evenly distributed throughout the mucous membrane. The walls of the reticular cells are higher than in the ox and more deeply serrated, but the small folds at the base are scarcely noticeable. There are fewer folds in the fundus of the abomasum than in the ox.

The liver is large and thick, and the edges more rounded than in the ox. The caudate lobe is pyramidal as in the sheep, and the umbilical fissure is visible on the parietal surface, but the oesophageal notch is slight.

Ruminating buffaloes, fed on grass, chew 30 times per minute, renewing the cud every 40 seconds, taking 15 seconds to do so, and very little variation from these figures is shown by any breeds or types. Oxen fed on the same grass, chew on the average 50 times per minute, regurgitate every 60 seconds and take 10 seconds to do so, but wide variation is shown by different breeds. The nutritive requirements of the buffalo are approximately the same as those of the ox, the 1,200 pound buffalo in quarantine stations receiving about 133 pounds of grass per day and thriving thereon. On natural pasture about six gallons of water are drunk in a day, but stalled buffaloes require an additional ten gallons to allow for bathing which is absolutely essential to maintain health. The faeces amount to about ten gallons per day; they have a strong odour. The abdominal circumference of the swamp buffalo is large, but the capacity of the stomachs is about the same as that of the ox, the breadth of the belly being compensated for by the shorter length and comparatively slight doming of the diaphragm. Rumination, as described above, is apparently more haphazard than in the ox, and it would be natural to infer that the buffalo would be at a disadvantage in dealing with fibrous material. On the contrary, however, buffaloes can maintain condition on coarser food than oxen, and are kept principally because of this ability. No physiological explanation of this capacity of the buffalo has yet been given.

F. Urinary and Sexual Systems

The kidneys of the buffalo differ only in minor details from those of the ox. They are large and elongated, and are firmer in texture and deeper in colour than in oxen. The lobulation is irregular.

The conformation of the buffalo, as a rule, differs in the sexes in the same manner as in oxen, except that in the swamp buffalo the bulls usually have narrow foreheads and long thin horns. This apparently effeminate characteristic seems to be the rule among the wild breeds of India and the feral specimens of Australia, and it forces one to conclude that it is a natural trait that has been bred out of the more domesticated river buffalo. It therefore seems unlikely that the stud abilities of a river bull can really be estimated by the shape of the head, but most owners, working on the analogy of the ox, believe that it can be and select accordingly.

In outward appearance the external genitalia of the two types of buffalo differ considerably. In the river buffalo the penis hangs clear of the abdomen by six inches to a foot, being attached thereto by a triangular fold of skin running from the umbilicus backward. (Many breeds of zebu have a similar formation.) The scrotum has a distinct neck and is definitely pendulous though it is only eight to ten inches in length. Such pendulous organs can be no advantage, and are probably inconvenient to animals moving in thick undergrowth, and it must therefore be assumed that they are the result of artificial selection, greater size and fertility having been, quite falsely, attributed to them. In the swamp buffalo the penis is adherent to the abdomen except for the last inch or so which hangs free or is attached by a small fold to the umbilicus; the scrotum has no neck, and it is only four inches in length when fully relaxed; in fact all the male organs are carried out of harm's way. In animals of good conformation, the scrotum is carried square with the body, but it is common to find it twisted round, owing to the thighs being set too close together.

It might be mentioned here that it is inadvisable to use the Burdizzo castrator on swamp buffaloes. Owing to the absence of neck to the scrotum it is extremely difficult to keep the cord within the jaws while, even if this difficulty is overcome, the thick skin makes it impossible to close the instrument sufficiently without setting up considerable pressure necrosis.

Except for this outward appearance or carriage, there are no differences between the male organs of the two types of buffalo. There is no hair tuft at the preputial orifice. The glans penis is thin, soft and flexible, and tapers to a fine point. The galea glandis is barely noticeable, the urethra is continued to within a millimeter of the tip, and the whole organ is cylindrical in section instead of flattened dorso-ventrally. In ejaculation the glans hardens but without any great enlargement, and vibrates rapidly, giving much the same appearance as the urethral process of the mating ram. The spermatozoa are more rectangular than those of the ox, and the pale stained portion of the head is perhaps one micron narrower than in the ox. The chromosome count is probably between 34 and 38, though this awaits confirmation. That of the ox is 60.

The testicles are between three and three-and-a-half inches in length and one-and-a-half and two inches in breadth, this being about the same size as those of a mongrel zebu bull. Oxen of selected breeds usually have testicles twice as large. When relaxed the

testicles hang with the long axes perpendicular, but in a tensed animal they are drawn up close to the body by very strong cremasters, and lie with the long axes pointing forwards and upwards. The descent of the testicle takes place at six months.

The bull buffalo starts mounting at two years old, though he is usually rather too short for successful service until three years. By six or seven years there is frequently a loss of potency, with a rising proportion of unsuccessful services, but desire continues until he is twelve or more, during which time his muscular strength seems to increase. Complete senility, that is, loss of muscular strength as well as desire, does not set in till over 15. A good bull of river type can serve 100 cows a year, but it is unusual to allow more than 12 cows to each bull, as each of these will be served several times during her heat. There is no rutting season or periodical masculine desire, though the dietetic seasons affecting only the cows are usually attributed, quite wrongly, to the bulls.

The female organs of both types of buffalo resemble those of the ox, except that the cotyledons are fewer. The udder of the river buffalo is similar to that of the dairy cow in position and shape but never becomes very large ; that of the swamp buffalo is small and situated far back between the legs so that it cannot be seen from the side, while her teats never acquire any great length, no matter how often she is milked. Again this difference in shape and position can be attributed to artificial selection.

Despite the similarity in organs there are marked differences in the physiology of buffalo and ordinary dairy cows. Buffalo cows have a cycle of 28 days, with a period of heat lasting from three to five days during which several services occur. This period is usually preceded by a copious mucous discharge, and its onset can sometimes be detected by a visible engorgement of the vulva, as well as the behaviour of the animal and her mate. In swamp buffaloes, however, desire seems to cease with daylight, and mating usually occurs only at night. Direct observation of these animals is therefore difficult, and owing to the risk of malaria in the swamps, may be dangerous, so it is best to be content with filling the prepuce of the bull with powdered methylene blue before dark and to take swabs from the vaginae of the cows next morning.

The visible signs of heat may be inhibited by discomfort or malnutrition, and so, in areas where the nutritional value of the grazing varies with the time of year, a dietetic breeding season may occur, but cows slaughtered between the breeding seasons are found to be in all stages of their cycle, proving that the failure to mate is due to lack of desire and not to failure to ovulate.

The period of gestation is usually given as ten and a half months. Actually it averages 332 days, or eleven months in swamp buffaloes and 317 days in river buffaloes. After calving, buffaloes may be successfully served at the 42nd day but swamp buffaloes will often fail to come on heat so soon and are rarely served before the 65th day. The young cows of both types can be successfully served at two and a half years. Calving continues to extreme old age, and cows reputed to be 20 years old and to outward appearance fully this age, are often seen with well fed calves at foot. Twins are not uncommon. The buffalo seems to be singularly free from obstetric trouble and rarely needs help at calving.

G. Lactation

As with the ordinary dairy cow, the period of lactation of the buffalo is variable, being influenced by the onset of pregnancy, the feeding and comfort of the animal and the amount of milk actually drawn. Naturally-fed buffaloes go dry about the sixth month of pregnancy, that is to say, seven to nine months after calving, but if pregnancy is delayed they may continue milking for a year. Well-fed river buffaloes of good milch breeds will lactate for 15 months if prevented from mating. The milk, when drawn under hygienic conditions, looks and smells like ordinary milk, but it is usual for it to acquire the peculiar odour of the buffalo and so become disagreeable to those not used to it.

Accurate milk records are difficult to obtain, as most owners allow the calf to suckle before milking. Most tables tend to show too low a figure for the quantity, and too high a figure for the fat content, as the calf has taken the first, less fatty milk. Swamp buffaloes have a daily yield of only six pints, leaving a very small margin over the necessities of calf rearing for the owner. Starvation is the normal fate of half the swamp buffalo calves whose dams are milked.

Well-fed river buffaloes yield up to two gallons per day, leaving a profitable surplus for the owner after calf rearing. This milk usually contains less than 8 per cent. fat, but river buffaloes of selected dairy strains may give as much as 11 per cent.

Buffalo milk is rarely consumed as whole milk. In Europe it is usually used for the preparation of butter or cream cheese, and in Asia for ghee. Ghee is prepared by curdling the milk and churning it thoroughly. The butter fat is skimmed off and heated to drive off all water, and strained through muslin to remove the protein. Little is left but pure fat. The butter milk from the first operation is used fresh. The ghee is bottled hot, and can be stored for several months. When unadulterated and uncooked it contains an appreciable amount of vitamin A, but its main nutritional value is as a fat. Ghee production is of greatest importance in rural areas where there is no distribution of vegetable fats, as factory products. In such districts the selection of good buffalo cows with high butter-fat yields is of primary importance.

H. Growth

The calves can be weaned at five months, but remain at foot for two or three years if allowed to do so, so that it is a common sight to see a buffalo cow followed by two or even three young ones at different stages of growth. Growth continues till about the tenth year, but is slow after the fifth, at which age the working bulls are broken in and put to light work, the loads being increased as they develop. When fully grown, a swamp buffalo will weigh about $\frac{3}{4}$ ton, a cow of the same age weighing $\frac{1}{2}$ ton. River type buffaloes usually weigh rather more, but vary according to breed.

Both types are reputed to live till 25 years old or so, and from the appearance of some specimens there is no reason to doubt this.

I. Sensory Organs

The buffalo has a dull sense of touch and of pain. Stinging insects are treated with comparative indifference, and serious wounds are well tolerated.

The sight seems to be short, but is difficult to estimate on account of the stoical attitude of the animal. The hearing is good, and taste and smell appear to be of the same order as in oxen.

J. Temperament

Though usually represented as savage, buffaloes are docile and easily managed—far more so, in fact, than other cattle. Their appearance is certainly fierce, but, although nervous with strangers, they will usually try to avoid them by moving off rather than stand their ground. A buffalo cow with calf at foot will, naturally, be rather nervous and may be irritable, and occasionally an old bull will develop a bad temper which he will exhibit equally to his owner and to strangers, but neither of these eventualities is as common as it is with other cattle.

SOME EXAMPLES OF BUFFALO FARMING

Buffaloes are kept by so many different races under such widely differing conditions that a complete study of them all would be a difficult undertaking. The following is a brief account of observations in Malaya and Italy.

A. The Swamp Buffalo

The inland areas of the Malay Peninsula consist of precipitous, forest-clad hills, intersected with valleys containing an alluvial soil. The rainfall is heavy and regular and the valleys are therefore naturally swampy or can easily be rendered so by damming the brooks that traverse them, but the lines between the swamp and the dry hillsides are sharply defined and are usually marked by a straggling collection of houses that constitutes a village.

The inhabitants of these villages are Malays whose traditional occupation is the growing of rice. They do not show much interest in animals, and usually content themselves with owning only sufficient buffaloes to work their plots. This usually means two or three head per person and at least one of these animals will be a bull. Except when actually working the plots, the buffaloes are left quite free and their behaviour can be observed with ease.

Naturally all the buffaloes of the village will collect into one herd, but a visitor arriving at midday will not see any sign of them, for the buffaloes are all in the swamps, lying asleep in their mud holes or wallows, with only their faces showing and even these covered with grey slime. About four o'clock in the evening, or earlier if it is raining, they emerge slowly from their mud holes, and start grazing on the reeds around. This grazing lasts until it is quite dark, after which they seek the drier ground on the hillside, and a period of distinct activity sets in. They can be heard, and sometimes seen, moving about freely, the cows bleating to the calves, and the bulls racing with each other, wrestling with their horns, and generally indulging in play, an amusing sight in such ungainly beasts. Shortly before dawn they return to the swamps and resume grazing till about ten in the morning, when they again seek their wallows. Usually each animal has its own wallow, and if one is not available it will soon dig one out with its hooves and horns. Sometimes the whole herd will crowd in together, lying with their chins on each other's backs. There they will lie ruminating and sleeping till evening.

The swamp buffalo is, in fact, a semi-aquatic nocturnal animal and experimental attempts that have been made to change these habits have failed. If they are stabled at night, breeding practically ceases, and if they are kept entirely on dry ground the calves become infested with parasites and are subject to joint-ill, and those which survive are weak and sickly. It is also important to note that swamp buffaloes cannot be driven along roads or across country in herds like other cattle, for if any attempt is made to drive them they make for the swamps and are soon lying in places inaccessible to man. They can be moved only by being led, one man to two or three animals, though the "man" may be a diminutive urchin if the buffaloes know him well.

Losses from tiger kills are not frequent, since on winding tiger the herd closes together, and the tiger will not readily attack such an assembly, of which each adult is more than his match in weight and strength.

Although about one-third of the herd consists of bulls, there is little fighting, and such as does occur is comparatively mild.

Management.—The calf running at foot has usually a ring of cord round the neck, with a piece hanging down to trip him up if he attempts to run away. This treatment accustoms the animal to restraint. If the cow is to be milked, the calf is penned near the house overnight. The cow is caught at dawn, and driven between two converging rails. After allowing the calf to suckle for a few mouthfuls the rest of the milk is drawn, the milker sitting directly behind the animal. The cow and calf run free for the rest of the day. All the milk is consumed by the owner and there is no commercial dairying; indeed, most cows are unmilked except by the calves.

At two years old the noses of both bulls and cows are pierced and ringed with a rotan ring. At five or six the poorer bulls are sold to the butcher and the best to timber haulage concerns. The main objection to castration lies in this need for hauling animals, for a castrate will not develop the large masculine hump and the heavy shoulders required.

With the onset of the rainy season, normally about September, the swamp land is prepared for the rice plant seedlings. Numerous banks or "batas" are built dividing the area into plots about 30 yards square, with the flow of water from one to another carefully arranged. Then two or three buffaloes are roped together and driven round and round in these plots, crushing down the reeds into the mud until the whole area is converted into a slimy quagmire. In this slime the seedlings are planted, and the buffaloes are driven off into the forest and fenced out there until, some six months later, the end of the harvest leaves them free to return to the swamps. During the period in the forest the buffaloes usually lose condition, and breeding is suspended, but the loss is soon made up on the long rich stubble in the swamps, and the luxuriant growth of reeds that appears among it. The buffaloes remain on the swamps, unused, until the return of the planting season renders their labour necessary.

The swamp buffalo is well suited to the puddling of the rice fields. They have the natural habit of stepping over the banks, on which river buffaloes would most certainly stand, destroying the irrigation

system. The short thin legs of the swamp animal are also well adapted for wallowing along in the mud. The use of buffaloes in this way can only be carried on in areas where there is sufficient forest available for the storage of the herd in the six months when the crop is growing. With the conversion of the forests to plantations it becomes impossible to practise the system and the number of buffaloes is reduced, resort being had to ploughing in cultivation of the rice fields.

Buffaloes used for timber haulage are usually in the hands of Chinese. They are fed with a gallon or two of rice gruel per day in addition to their usual grazing. Draught buffaloes may become magnificent beasts, working ten hours per day (1 a.m. to 11 a.m.) and moving a dead weight of up to a ton.

Among other uses to which these animals are put are the working of water-raising wheels, towing barges in rivers and canals and puddling clay for building.

B. River Buffaloes in Malaya

River buffaloes are a comparatively recent introduction to Malaya and, at present, are kept only by the Northern Indian immigrants in the neighbourhood of the towns in which the ghee will find a ready sale. There are, nevertheless, many areas which would be suitable for their upkeep. They require shallow pools or rivers with fairly firm bottoms in which to lie for the midday period of rumination and sleep, and long grass or short bush on which to graze. When an area of inland, heavy timbered, forest is felled and the soil exposed to sunlight, a heavy and almost pure growth of lalang (*Imperata cylindrica*) becomes established, and persists for a considerable time. This grass, standing waist high, is siliciferous and coarse, and lacks phosphorus. It is of very little value for oxen, but river buffaloes appear to be able to maintain themselves upon it almost entirely. The new forest growth which follows the lalang still provides food for the buffalo until the green growth is too high for them to reach.

Apart from the love of wallowing the river buffalo has much the same habits as the ox. They are diurnal or can live under diurnal conditions; they can be assembled and driven in herds; and they take readily to artificial foods. In the settlements of Northern Indians in Malaya, advantage is taken of this, and buffaloes and oxen are farmed side by side. The herd is used entirely for milk production and the bulls are sent early to the abattoirs. None of the draught breeds have been at all widely used in Malaya.

C. The Italian Buffalo Farms

The Mediterranean buffalo, a breed of the river type, was probably adopted in Europe for the same reason that caused its adoption in Asia, namely, an extreme docility and an ability to thrive on coarse pasture with the minimum of attention—a very important advantage in areas riddled with malaria. In Southern Italy, herds of buffaloes are still maintained despite the rapid conversion of marsh and moorland into arable ground. There is still considerable waste ground available for them in many areas and, even where none is left, the demand for buffalo milk is sufficient to justify the retention of the herds even though drastic alterations in the method of farming are necessitated. Thus there are, at present, two systems in use, the original moorland and marsh farming, and the new intensive method that is supplanting it.

The Italian marshes consist of a soft alluvial soil, generally about the consistency of the Thames water meadows. They are covered with grass sedge and bush growth, all of which is "lush" rather than "rank," and watered by numerous gravel-bedded streams and ponds, but there is little or no actual quagmire. The buffaloes not only give a good return from this lush and rather luxuriant growth, but help to keep open the water courses. During the summer months the marshes tend to become arid, and the herds are moved to the hills or moorlands where there is always sufficient rough grazing to maintain them till the autumn rains have begun.

The Italian buffalo are rather smaller than most Indian breeds and have a considerable growth of hair, especially over the shoulders, head and under the jaw. They are usually quite black and complete albinos are unknown. The horns are short and never make a complete circle. They are very docile animals.

The herd may consist of anything up to a hundred cows, with two or three bulls, only one of which does any breeding. It is said that the others, which do not breed, act in some way as psychical stimulants to the breeding bull. The bulls are pubic at about 18 months old, and are usually kept till the sixth or seventh year, but a very good animal may be kept to 11 or 12 years. There is no breeding season, but the bulls are usually removed from the herd between December and March to prevent the birth of calves in winter.

The cows become pregnant at about three years old, and any that have not calved by the seventh year are removed from the herd and used for light work. Breeding continues until extreme old age, the average being 18 years and the maximum about 22, and it is unusual for a cow kept on the marshland system to calve oftener than every other year. Lactation lasts for 240 days and even longer if pregnancy does not intervene, probably on account of the selection of cows on conformation, which is an age-old practice.

Milking is carried out only once per day, in the early morning. The calf is allowed to suck first, the same superstition prevailing as in Asia. The calves wean themselves naturally at eight to nine months. Surplus males are castrated and sold as low-grade beef when they mature. Some are used for light work.

With the reclamation of marshland and rough grazing, the number of herds of stall-fed buffaloes is on the increase. Silage and fresh-cut silage crops are the main diet, supplemented by hay, minerals and concentrates. The ration is brought to about the same balance as used for oxen, except that a larger proportion of dry matter is allowed. In some more advanced herds the calves are removed as soon as the colostrum has ceased, and bucket-fed on cow's milk, leaving the higher-priced buffalo milk for sale to the cheese maker.

If buffaloes are stabled continuously certain problems arise which have not been solved. There is a high death rate from pneumonia, and the calves are weakly and show a great susceptibility to cutaneous parasites and other skin troubles. Rheumatism claims 2 per cent. of the middle-aged animals every year. If the

buffaloes are allowed 12 hours' freedom, that is to say if they are turned out during the day in winter and during the night in summer, these troubles are almost obviated. In spite of the advances made in the selection of animals for milk production based on performance, and the improvement in methods of management, it must be stressed that buffaloes cannot be economically farmed on intensive lines unless there is a demand for their milk in preference to any other.

Conclusions

The buffalo belongs to the same zoological family as the ox and bison, but is not in the same genus. On bush and forest growth, sedge and reeds, it thrives better than the ox, but on good pasture grass or concentrated food it is usually inferior. It is normally kept with the object of rendering some return from otherwise useless pasture, though occasionally a local preference for its milk may make it a profitable animal on " intensive " farms.

Two species, or two varieties of one species, of buffalo have been domesticated : the swamp buffalo, which is semi-aquatic in the sense that it can feed entirely on aquatic plants and live day and night in swamp ; and the river type buffalo, which feeds and lives normally on dry ground and enters water only for bathing and sleeping. The river buffalo has been selectively bred for milk, and in India for work as well. The swamp buffalo has not been selectively bred, and such differences as do occur are due to geographical isolation.

With the draining and cultivating of land, the buffalo tends to give place to the more profitable ox. This process will certainly be sufficiently long delayed to ensure a long future for the domestic buffalo ; and an attempt is surely justified to improve the present strains and make the buffalo an even more valuable animal in its own peculiar sphere.

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EFFECT OF RATIONING ON MILK RECORDING

The report presented at the annual meeting of the Scottish Milk Records Association disclosed the fact that the total number of herds that were being officially recorded at the end of April was 795 as compared with 863 in 1940, and 903 in 1939. Moreover, the total number of cows tested might show more than a corresponding reduction.

In certain cases the feeding-stuff rationing scheme has been put forward by farmers as a reason for discontinuing milk recording, but, states the report, it is being pointed out that there is now a very real reason why milk recording should be practised, as it is only by the systematic weighing and sampling of milk yields of individual animals that economic and adequate feeding can be arranged.

The report nevertheless admits that the feeding-stuff position affected yields to a certain extent in the latter part of the year, but that the full effect of this was not apparent in the 1940 records.

BOVINE STERILITY

Treatment of Cows and Heifers which do not come in Oestrus

P. BHATTACHARYA, Ph.D. (Edinburgh),
J. HAMMOND, Jun., B.A., and F. DAY, F.R.C.V.S.
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During the late autumn and winter months quite a large percentage of heifers fail to come in oestrus, although they are not in calf. Cows are affected in the same way but to a less degree.

As breeders are anxious to get most of their heifers and a number of cows in calf at this time of the year, in order to ensure a supply of milk at the period when it is most valuable, it has been decided to publish this short article on methods of induction of oestrus in the cow, so that veterinary practitioners should be acquainted with means of treating these animals.

Before deciding on the cause of any cow not coming in oestrus, it is essential that an examination of the ovaries should be made.

In many cases a corpus luteum will be present in one ovary ; if this is the case it means that either the cow is having a regular cycle, and ovulating every 21 days without showing oestrus, or it may be a persistent corpus luteum. In either case the treatment is the same ; the corpus luteum should be removed from the ovary by digital pressure from the rectum, and a normal oestrus period will follow in two to five days.

Occasionally one or two large cysts will be found in one or both ovaries. Treatment in these cases is carried out by rupturing the cysts by digital pressure per rectum, but as cysts are inclined to re-form, the cow should be examined again in seven to ten days. If a corpus luteum is present then nothing further should be done as the cow will come in oestrus about 21 days from the time of rupture. If another cyst has formed, then it should be ruptured as before, and in most cases a corpus luteum will be found and the cow can be expected to come in oestrus 21 days from the second time of rupturing the cyst.

In the majority of cases of cows and heifers failing to come in oestrus in the winter months, the ovaries will be very small, and no corpus luteum, or large follicle, will be present in either ovary. This means that the animals are in an anoestrus condition and, through lack of pituitary stimulation, the ovaries are in an inactive condition.

It has been found in these cases that the injection of the follicle-stimulating hormone from pregnant mare serum will induce oestrus and ovulation, oestrus appearing on the second or third day after injection, and the chances of the cow becoming pregnant from a service during an induced oestrus are the same as from natural service.

The dose necessary to induce oestrus is 1,000 to 2,000 international units of pregnant mare serum extract and the method of administration is by subcutaneous injection.

There are three points to be mentioned as warnings in the use of this hormone.

It should never be injected when a corpus luteum is present : it is not only unnecessary, as oestrus can be induced by removal of the corpus luteum, but if

given in the presence of a corpus luteum cysts may be formed in the ovaries.

The use of 1,500 international units should not be exceeded as again with large doses of the hormone cysts may develop.

The injection of hormone should never be given at the same time as removing the corpus luteum, as in this case multiple ovulations may occur with the danger of twins or worse.

Pregnant mare serum extract is marketed by several different drug houses, under their respective trade names, and the dosage of these should be the number of units previously indicated.

The injection of pregnant mare serum is not indicated in the treatment of any form of sterility except the anoestrous condition when no corpus luteum can be detected in the ovary.

A BLASTED HORSE—AND OTHERS

Following is the text of a letter, published (under the above heading) in a recent issue of *The Lancet*, from Mr. H. F. Buxton, of Ware, Herts: "The article on what a layman may call a shell-shocked pheasant in your issue of February 8th suggests that similar particulars may be of interest in the case of a horse.

"Idol, a very good dray-horse, six years old, had been working for eight months for a London brewery. Last autumn, at 4 a.m., a heavy H.E. bomb demolished a building and 20 houses about 80 yards from the stable, which is on the ground floor. Intervening houses prevented any damage being done to the building, except a skylight, but of course there was a terrific bang and concussion. Fourteen horses, then probably all asleep, were all right except for being frightened and restless. Idol and another lay unconscious. The other (aged 11) recovered in two hours, and with massage treatment was at work 48 hours after, and has suffered no permanent ill-effect. Idol lay as dead for over four hours, with such a slow pulse that the stable foreman decided it was hopeless and the humane killer was brought to kill him. Suddenly he shivered all over and got up, but could not use his hindquarters to walk. Fermentations and massage were applied and a week after he was able to do light work, constantly needing rest days but working four days out of six. There was slight lameness in the hindquarters.

"Three months afterwards there was a direct hit on the same stable, killing two horses outright. The remaining 12 were able to walk out and most were at work that day. Idol had a bad relapse, and now a month later is little better. He cannot back and finds difficulty in turning, the symptoms being paralysis along the spine. It is feared there will be little more work for him in London, though it is intended to give him six months' rest at grass during the summer, in the hope of a cure.

"Other animals in a country district were affected after land-mines had been dropped. The rabbits—even in their holes—suffered from shock and hopped out of them aimlessly and could be picked up by hand. The cows similarly behaved in a dreamy way, refused to eat and had to be slaughtered."

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Weekly Wisdom

The sentiments of a man while he is full of ardour and hope are to be received, it is supposed, with some qualification. But when the same person has ignominiously failed and begins to eat up his words, he should be listened to like an oracle. . . . It is held to clinch the question logically when an old gentleman waggles his head and says, "Ah, so I thought when I was your age." It is not thought an answer at all, if the young man retorts: "My venerable sir, so I shall most probably think when I am yours."—R. L. Stevenson, *Virginibus Puerisque.*

THE VETERINARY RECORD

August 2nd, 1941.

THE DOMESTIC BUFFALO

IN this issue much space is devoted to an abridged article on a subject which at first sight seems likely to interest only a very small section of our readers. We make no apology for its insertion and only regret that space is not now available for a full reproduction of the author's interesting and well-illustrated text. We are sure it would be read with delight by all veterinarians who are gifted with the naturalist's outlook upon the subjects that come their way in the course of their professional work. It is to be feared that among veterinary graduates in recent years, with increased specialisation in the highly diversified subjects that are contributory to veterinary knowledge, the naturalist's outlook towards their work has much diminished. This is a phenomenon which has also been deplored by distinguished senior members of the medical profession as occurring in their calling.

General practitioners often may have felt of late that the increasing amount of space devoted in this journal to highly technical articles, cast in the stereotyped language of the laboratory, is evidence of the drift in perspective away from the animals themselves that fall under our charge to the intricacies concerned with the microparasites that cause disease in them. A salutary compensating counter-phenomenon is the increased insistence now laid on the paramount importance of animal husbandry, and all that this implies, in the teaching of veterinary students. To any earnest worker upon the problems that confront the veterinarian in the overseas Empire, the neglect on the part of veterinary educational authorities at home to foster this aspect of training is one that comes to mind as having cost the profession so dear in prestige and opportunities that it must now be looked upon as culpable. Only now, with the advent of total war and the consequent instillation in the mind of the profession of a sense of realities, have we come to view even at home the problems that confront the veterinarian in the light of their true worth to the public, and fostered—we hope not too late—interest in matters of agricultural importance rather than in the unrealities of the immediately remunerative luxury or sentimental subjects of pre-war times.

In vast areas of our overseas Empire the domestic buffalo is an animal that comes next in importance only to the ox. A great deal has been done by our colleagues, in India and Africa, in warding off the ravages caused by epizootic diseases in this species. Very little indeed has been written upon the husbandry of this useful and faithful animal. This is surprising when we realise the intimate part which it plays in the lives of millions of our fellow-subjects in tropical and subtropical countries, and reflect upon the valuable articles in home consumption,

such as rice, which are imported into this country by harnessing its labours in distant lands. We would say that Mr. Macgregor's thesis on this subject, fully printed and perhaps amplified in some respects, would form an indispensable primer to those veterinarians taking up their careers in countries where the buffalo plays an important part in husbandry. Examples of valuable work of this kind done by our colleagues are the publications of Leese and Cross on the camel. We cannot help but feel on reflection that where veterinarians have taken up work overseas with the outlook of the born naturalist towards their animal subjects their contributions have been of transcending importance.

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BOVINE INFERTILITY

RANKING high amongst the major causes of loss to the dairying industry brought into public prominence by the work of the Association's Survey Committee is the failure of cows to conceive readily. The anxiety of practitioners to-day to equip themselves fully to remedy this situation is revealed by the high degree of interest which is being aroused within the profession in the diagnosis of pregnancy and the treatment of infertility in bovines. This is evidenced by the reports published in this week's Supplement of discussions at some of the special meetings of the Divisions called to enable Members to witness and discuss demonstrations on the live or dead animal. Also typical of the interest created is the receipt of such papers as that appearing in this issue by three workers in this field.

Through this one feature, indeed, the Survey Committee's Scheme, whatever may be its fate, cannot fail to produce a harvest of immense benefit to agriculture, for not only has it stimulated members of our own profession to action, but it has aroused interest in the minds of agriculturalists throughout the country. From all quarters, we are receiving information that stock-owners are seeking veterinary advice both earlier and more frequently in dealing with the problem of bovine infertility.

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AGRICULTURAL IMPROVEMENT COUNCIL, SCOTLAND

IN our issue of July 5th we drew the attention of our readers to the most regrettable omission of a veterinary representative from the Agricultural Improvement Council for Scotland.

We note in our columns elsewhere that this matter has been taken up in Parliament and that Sir T. Moore addressed a suitable question to the Secretary of State for Scotland. The original reply given by Mr. Wedderburn was most evasive and the more pertinent supplementary question which followed failed equally to bring forth a satisfactory answer.

To insinuate, as Mr. Wedderburn does in his further reply, that the deliberations of the Council will not be adversely affected by the absence of a veterinarian, is to fail completely to appreciate that the veterinary surgeon is not a specialist in a narrow field, but that his knowledge covers the whole field of animal health and disease.

We are indeed greatly disturbed that a Parliamentary Representative of one of the most important Government Departments should display so parochial an appreciation of some of the functions undertaken by his Department.

It is clear that the Profession must continue to press for a change in the attitude of the Authorities to this important matter, for without sound advice on the problems of health and disease of farm stock, there can be little improvement in the agricultural industry of Scotland.

CLINICAL COMMUNICATION

Traumatic Pericarditis

A Case with Unusual Features

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Christchurch

Subject.—A cross Jersey cow.

History.—She had calved normally about a fortnight previously and, except for an obstructed teat duct, was apparently healthy in every way.

Clinical History.—Professional advice was sought on account of an enormous swelling, which was said to have developed overnight, on the left side of the abdomen. On examination this was found to extend from the sternum to the udder and from the lower limits of the abdomen to halfway up the flank. As purulent material was obtained on passing an exploring needle, it was decided to lance the skin in the middle line of the abdomen. Two gallons of brown and very foetid fluid were thereby evacuated. Exploration of the cavity failed to reveal any explanation for the condition.

Following daily irrigation of the cavity the cow progressed well until a fortnight later, when she developed a cough, a small swelling on the chest wall in the left elbow region and a persistent temperature. Marked loss of condition resulted and slaughter was decided upon.

Post-mortem Examination.—This revealed that a 4-inch piece of wire had penetrated the thorax in the usual manner. The pericardial sac was heavily infected and contained a mass of green foetid material. Slight ulceration of the myocardium was in evidence, suggesting that the wire had thus far followed the course usual in these cases. Thereafter the wire had turned outwards, passed through the edge of a rib and moved forward, where it was located free on the external thoracic wall. Necrosis of bone and a minute fistula were present where the rib had been penetrated.

Discussion.—The following points about this case appear to call for consideration :—

Was it the flexible nature of the foreign body which had allowed it to be diverted outwardly after reaching the heart ?

If so, why was a rib punctured when an easier path could have been found through an intercostal space ?

(*Concluded on col.* 1, *page* 453.)

ABSTRACTS

[THE USE OF ANTHRAX VACCINES PREPARED FROM AVIRULENT (UNCAPSULATED) VARIANTS OF *BACILLUS ANTHRACIS*; THE IMMUNISATION OF LABORATORY ANIMALS AGAINST ANTHRAX. Sterne, Max. (1939.) *Onderstepoort J. Vet. Sci. and Anim. Indust.* **13**. 307-317.]

Avirulent variants of *B. anthracis* suspended in 50 per cent. glycerine-saline were found to retain their immunising power in sheep for one year after the preparation of the suspensions. One strain was selected for the production of an avirulent spore vaccine. This vaccine was suspended in 0·5 per cent. saponin in 50 per cent. glycerine-saline. Field tests were carried out on two and a half million cattle and several thousand horses and sheep. In cattle, horses, sheep and camels the results were entirely satisfactory and reactions to the inoculation of the vaccine were slight. Large doses of vaccine could also be given to goats under laboratory conditions; in the field, however, four goats died out of 400 vaccinated; no anthrax septicaemia was observed.

Experiments were performed to ascertain whether mice could be actively immunised against anthrax and to compare their reactions with those of guinea-pigs. Three strains were used: (*a*) the rough, uncapsulated, avirulent, immunising variant used in the cattle vaccine; (*b*) a dense suspension of this variant killed by boiling; (*c*) a rough, uncapsulated, avirulent, non-immunising variant. Guinea-pigs immunised with (*a*) were almost completely resistant to a test dose of Pasteur II strain whereas those inoculated with (*c*) were susceptible. In mice, 55 per cent. were immunised by (*a*) compared with 24 and 28 per cent. with (*b*) and (*c*) respectively. Mice were found to be less susceptible to anthrax than were guinea-pigs; they were found to develop a considerable non-specific resistance. Guinea-pigs inoculated with large doses of (*a*) developed a solid immunity in five days; no immunity was conferred by similar doses of (*c*). Guinea-pigs were found to show a specific increase in resistance to anthrax 24 hours after vaccination. E. C. H.

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[STUDIES ON DEGLUTITION IN SHEEP. Watson, R. H. (1941.) *Austral. vet. J.* **17**. 52-58.]

The main conclusions derived from a series of radiological studies on deglutition in sheep with special reference to the functioning of the oesophageal groove are as follows:—

The route taken by fluids during deglutition is in the main independent of the temperature and composition of the fluid, and of the posture of the animal. For the greater part of the period during which lambs suck the ewe milk passes directly to the abomasum in most animals, provided they suck eagerly and efficiently. From the time they begin to drink water spontaneously to quench their thirst usually all of it passes to the fore stomach. On the other hand, the course of liquid taken as a drench varies largely with individual sheep. In some animals, up to four years of age at least, it always passes either completely or partially to the abomasum as the result of a reflex response of the oesophageal groove mechanism to mechanical and possibly chemical stimulation of the regions of the mouth and pharynx. The course was little influenced by the state of hunger and thirst of the animals, by giving the drench to the animal turned on its back or by administering the fluids faster and under greater pressure.

No experimental details are supplied but the bases of the conclusions are briefly given. A. R.

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[THE EFFECT OF LARGE DOSES OF SULPHANILAMIDE ON THE COURSE OF STRANGLES IN ADULT HORSES. Steck, W. (1940.) *Schweiz. Arch. Tierheilk.* **82**. 325-332.]

One large dose produced only a temporary improvement and the temperature again rose after three or four days. Repeated doses at either daily or two-daily intervals produced a favourable result. Out of 34 cases treated in this way a favourable effect was produced in 17 cases, nine cases were doubtful and eight negative. The results were judged by the fall in temperature in comparison with undosed cases and were subjected to statistical examination. The author finally recommends the use of 80 gramme doses (given in water by stomach tube) at two-daily intervals until the temperature falls. The importance of complete rest during the period of fever and for three days after is emphasised; it is also stated that the usual local and surgical treatment has no influence upon the course of the disease. A. T. P.

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[DIAGNOSIS OF ECHINOCOCCAL (HYDATID) DISEASE IN MAN BY INTRADERMAL REACTION TO RABBIT CYSTICERCUS ANTIGEN. Rose, H. M., and Culbertson, J. T. (1939.) *Proc. Soc. Exp. Med. Biol.* **41**. 2. (3 refs.).]

A skin test involving the use of carbolised fluid from fertile hydatid cysts of either sheep or man has long been recognised as the most reliable diagnostic aid to detection of echinococcus infection (Casoni, T. *Folia Chem. Micros.* 1911-12. 4. 5.). A report is now furnished of successful results attending the use of an antigen prepared from cysticerci from rabbits (*C. pisiformis*). Taxonomically and serologically rabbit cysticercus is closely related to echinococcus.

Four patients known to be infected with hydatid were tested. All gave prompt and vigorous positive reactions. Wheals began to form in less than five minutes and reached their maximal size in 15 to 30 minutes. The wheals were 2 to 4 cm. in diameter, with a surrounding zone of erythema about 5 to 10 cm. wide. The reaction faded in 12 hours. The reaction to rabbit antigen was always more intense than to human antigen. All of 20 controls were negative. D. D. O.

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[COLOUR MARKINGS IN RHODE ISLAND RED CHICKS AS RELATED TO SEX AND ADULT COLOUR. Hays, F. A. (1940.) *J. agric. Res.* **61**. 69-74.]

It has been stated that R.I.R. chicks vary widely in the colour and markings of their down. In this investigation this point has been studied in 8,713 R.I.R. chicks in regard to its possible value as a sex indicator

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Did the abdominal swelling arise through drainage from the chest cavity by way of the fistulous track through the rib?

Was the history of overnight development of the abdominal swelling incorrect? May it not have been developing for some time, remaining undetected until the act of calving reduced the pendulous nature of the abdomen.

at hatching. It was found that, of this number, 73·24 per cent. showed no markings whatsoever, whilst only 26·76 per cent. had black or brown stripes or spots in the down. Only 10 per cent. of the male chicks had colour markings as compared with about 44 per cent. of the female chicks. These results show that female chicks are more likely to have markings than males, but since only about one-fourth of all chicks were marked it is evident that colour markings in the down have no value as an indication of sex in day-old chicks of R.I.R. breed. It was further found that chicks of both sexes that carried some black pigmented areas developed a slightly darker adult plumage and fewer mottled individuals than chicks with solid down colour or with brown pigmented areas.

N. J. S.

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It is regretted that reference to the fact that the article was published in *The Veterinary Journal* (96. 427-437) was omitted from the heading of the abstract of "Fowl Paralysis: Transmission of Infective Agent to Young Chicks," by R. E. Glover, published in our last issue (col. 1, p. 437).

ROYAL COLLEGE OF VETERINARY SURGEONS

Membership Examinations (July, 1941)

LIST OF SUCCESSFUL CANDIDATES

(*Continued from page* 439)

Edinburgh (contd.)

Final Examination:

Agnew, J. H.	Lancaster, J. E.
Anderson, W. R.	Loughran, J. D.
Aylward, B. G.	Leitch, J. M. F.
Bamber, W. B.	McCormac, S. F.
Bannister, Dickson	Macdonald, Donald
Bell, David	McGowan, Daniel
Brown, J. M.	McKinnon, D. J.
Cameron, Douglas	Millar, P. G.
Cloke, J. N.	Milne, F. J.
Coles, N. D.	Ord, George (S)
Cruickshank, John	Owen, D. W.
Davis, R. H. K.	Pattison, I. H.
Deas, D. W.	Pook, H. L.
Dixon, Edwin	Proctor, F. J.
Drummond, D. J.	Quarmby, W. B.
Etoe, J. K. D.	Raises, M. B.
Ford, M. P.	Robertson, A. I.
Garfitt, C. R.	Saksena, P. D.
Halcrow, R. G.	Sinclair, D. F.
Heath, G. B. S. (M)	Stamp, J. T.
Irwin, S. A.	Wilson, Peter (S)
Kershaw, G. F.	Wood, R. L. (S)
Laing, J. A.	Williams, F. M.

(M) Denotes credit in Medicine.
(S) Denotes credit in Surgery.

* * * * *

"We shall, as far as one can see, get about 2½ million tons of feeding stuffs from overseas instead of 7½ to 8 million tons before the war. That is a big gap to fill, and it will need a great deal of ingenuity in considering how we are going to carry through our programmes on these reduced quantities."—*Professor J. A. Scott-Watson.*

* * * * *

Lord Woolton, Minister of Food, has appointed Lord Horder to be his personal adviser on medical aspects of food problems.

IN PARLIAMENT

Agricultural Improvement Council, Scotland

THE ABSENCE OF VETERINARY REPRESENTATION

In the House of Commons on Thursday of last week Sir T. Moore asked the Secretary of State for Scotland why the recently constituted Agricultural Improvement Council for Scotland, consisting of 13 members, does not contain one member of the veterinary profession, despite the fact that the profession is represented on the parallel body constituted for England and Wales; and that animal farming is proportionately more important in Scotland than in England?

The Joint Under-Secretary of State for Scotland (Mr. Wedderburn): The composition of the Scottish Agricultural Improvement Council is as follows:—

The Secretary of the Department of Agriculture for Scotland, who is Chairman.

Three members of the governing bodies of the Agricultural Colleges who are also practical farmers.

Three senior members of the teaching staff of the Agricultural Colleges.

Two members of the Agricultural Research Council.

One representative of Scottish farm servants.

Two members of the Department of Agriculture who have technical qualifications.

The Secretary of the Council is an officer of the Department of Agriculture, but he is not, of course, a member of the Council. My right hon. Friend did not give special representation to any particular branch of science but selected persons who were competent generally to discharge the functions for which the Council was set up. The Council will, of course, call into consultation specialists on any subject, veterinary or otherwise, on which they may require information or advice.

Sir T. Moore: While I thank my hon. Friend for information which I have not really asked for—the composition of this Committee—does he not recognise that this failure to put any veterinary officer on this body is casting a very serious slur on a distinguished profession, and is also causing a certain amount of alarm to the animal farming community of Scotland, who feel that their interests will not be adequately represented unless there is a veterinary representative on the body?

Mr. Wedderburn: I do not think so. There are a great many branches of science, including veterinary science, whose advice will be of the highest value and which will be sought. I do not think that the relations of the Council will be adversely affected by its membership not being overcrowded with specialists.

* * * * *

Minister's Survey of Farming Policy

In the Commons on July 24th, with the House in Committee of Supply, a debate took place on food production and distribution.

Surveying farming policy, Mr. R. S. Hudson (Minister of Agriculture) said that it was dangerous to prophesy before the harvest was in, but given ordinarily reasonable weather between now and the middle of September we could count on the farmers of this country producing a greater weight of output of food than in any year in this century. The nation had reason to be very grateful to the war agricultural committees, the farmers, the workers and the landowners. The average level of farming efficiency had definitely risen in the last six months. The farmers in the last 12 months had been asked to revolutionise

their farming methods. Under the guidance and help of the committees that revolution had been accomplished and the magnificent crops he had seen as he travelled about the country were definitely the result of improved cultivation and the increased quantities of artificial fertilisers, which had been distributed and used in a more discriminating manner. The farmers had accepted these new methods and had been well backed by their workers, and the landowners had co-operated with the committees not only in ploughing up their own land, but also in assisting their tenants.

In the two years before the war milk production reached record figures. Farmers were doing extremely well to maintain production within 10 per cent. of those records. (Hear, hear.) The consumption of liquid milk had been largely increased since the war began, by deliberate Government action. There was an increase of 20,000,000 gallons in the first year of the war, and if the present rate continued the increase in the second year would be over 100,000,000 gallons more. Taking the year as a whole, he thought it would be possible to maintain this largely increased war-time production.

The policy that had been pursued for the last 12 months had been to try to increase the total food production of all kinds. That policy had the advantage that, as far as war-time needs would allow, it maintained the balance of agriculture and the fertility of the soil—a matter of vital importance to ensure increased food production in future years. It would be the height of folly to concentrate on one single item of foodstuffs, at a possible cost in the reduction of the total production of food as a whole.

Reserves of Feeding-stuffs

Nobody could say whether we had yet reached the right proportions between our livestock and our available feeding-stuffs. What was certain was that there were great potential reserves of feeding-stuffs in this country which were now being brought into use. In addition to the waste food products from the towns which were excellent for pigs and poultry, there were on the farms great reserves of grass. In peace-time, when there were unlimited supplies of cheap imported feeding-stuffs, probably one-third of our grass was wasted through undergrazing, and these large hidden reserves were now being brought into use. Each farm must be treated on its own, to make sure that it pulled its full weight and that the available feeding-stuffs on each farm were used to the fullest extent. That was the policy he intended to pursue. He had been impressing on farmers that they must make themselves self-supporting this winter, and he thought the advice had been taken. No farmer would be compelled to get rid of any sound cattle that he could feed on his own farm. The corollary was that every farmer should be allowed to keep the feeding-stuffs he could grow for feeding his own cattle.

Winter Rationing

With regard to rationing for next winter, every farmer was expected to make himself self-supporting, but it was necessary to make provision for certain dairy cows and cases of poultry and pig owners who were unable to be completely so. Supplies of cake would be allotted in the first instance to dairy farmers. The broad principle of the rationing scheme was that it should apply to dairy cows. Farmers would be allowed to keep on their farms as many cattle, pigs, horses and poultry as they could properly keep having regard to the feeding-stuffs they got, but there would be no specific rations for farm horses, beef cattle, or sheep.

More land was being cultivated and the local committees had taken possession of 150,000 acres of land that was either not cultivated before or badly cultivated. In some cases the committees had told the landlords to offer the land for reletting or themselves produce increased quantities of food. They were convinced that, apart from a negligible minority of failures, this year an acre of arable land produced much more than an acre of grass. He had asked the local committee to plough another 2,000,000 acres of grass. If the war went on, they would gradually take the plough right round England. They would have bigger crops and better grass.

He and the farming community realised the size of the task confronting them. They were heartened by the results achieved this year, and were encouraged to do better still next year. They could be relied on to pull their full weight in the drive for victory. (Cheers.)

Mr. W. Roberts said the emphasis in the Minister's policy ought now to be changed in favour of producing food for direct human consumption. Dairy herds were being reduced, but he was not at all clear that the intention was to reduce beef herds. All the scientific evidence went to show that the pig and the hen were more economic converters of foodstuffs than beef, yet beef cattle had had priority all the time.

Mr. Roberts continued: "I would like to say a word, in passing, on the subject of the production of dairy cattle. The tendency to deal with each farm individually can be overdone. Why should the owner of a tuberculin-tested herd be asked to reduce his stock by 5 per cent.?

[Mr. Hudson *indicated dissent.*]

Mr. Roberts: He has. It is a fact, because I have seen it with my own eyes. It may be only in my own county. I have never seen it in the Press or elsewhere. I would definitely ask whether instructions have gone out from the Ministry that no farm which holds a T.T. licence is to be required to reduce its stock. The problem does not seem to have suggested itself to the Minister, so I will refer the problem to him. I challenge him to deny my assertion that no instructions have gone out from the Ministry of Agriculture that tuberculin-tested herds shall not be treated in the same way as other herds. If I am wrong, I shall be glad. In Whitehall and Westminster, reducing dairy herds may be explained by diseased cattle and so on, but when it gets out into the counties it comes down to a reduction on each farm of good cattle as well as of bad. I am told that this is happening in various places. Again, the instructions which have been sent out on the subject of farm labour do not result in only the redundant and superfluous workers being called up. It works out that each county has to find a quota of men, and the men are taken from the farms which it is thought have the most men. It means that the farm which is most intensive, which employs the most men and is producing the most, loses its men."

Sir E. Ruggles-Brise said he was alarmed at the pace at which the slaughter of pigs and poultry had proceeded, and hoped this heavy attack would be modified.

Earl Winterton said it should be considered an offence against God and man to own a single piece of waste land which was not growing food for human or animal consumption.

The Parliamentary Secretary to the Ministry of Food (Major Lloyd George) replied for the Government, but did not deal with Mr. Wilfred Roberts' challenge when Mr. Hudson had indicated dissent from his assertion that the 5 per cent. reduction applied to tuberculin-tested herds.

* * * * *

Among questions and answers recorded, in addition to those relative to the absence of veterinary representation on the Agricultural Improvement Council for Scotland (*vide supra*), are the following:—

Hill-grazing Subsidy

Mr. Wootton-Davies asked the Minister of Agriculture whether the hill-grazing subsidy for cattle and sheep, which is now limited to Scotland, is working satisfactorily; and whether he will consider extending it to Wales?

The Minister of Agriculture (Mr. R. S. Hudson): The scheme for subsidising cattle on hill-grazings in Scotland with a view to encouraging the improvement of hill pastures was only recently introduced, and I am advised by my right hon. Friend, the Secretary of State for Scotland, that it is too early to report on its progress. I am considering whether a similar scheme is needed in England and Wales.

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Friday, August 1st.—Meeting of Council, N.V.M.A., at the Connaught Rooms, Great Queen Street, Kingsway, W.C.2, at 2 p.m.

* * * * *

Control of Diseases of Farmstock

A further meeting for consideration of the proposals put forward in the Association's Scheme for the control of some of the diseases of farm livestock is to take place at 2 o'clock on Wednesday, August 6th, at 45, Bedford Square, W.C.1, between representatives of the National Farmers' Union, the Animal Health Division of the Ministry of Agriculture and the National Veterinary Medical Association.

* * * * *

PERSONAL

Col. R. J. Stordy.—We are glad to inform our readers that Col. R. J. Stordy is maintaining the good progress already reported, following upon his operation. We understand that his medical advisers are well satisfied with this progress and it is hoped that the Colonel will be able to leave for a holiday within a reasonable period.

* * * * *

Roll of Honour

Lieut. E. Murray Lamb (R.N.V.R.), M.R.C.V.S.

We learn with deep regret of the official presumption that the death has occurred of Lieut. Ernest Murray Lamb, R.N.V.R. Air Arm, who qualified M.R.C.V.S. from the London College July 16th, 1931. Lieutenant Lamb, whose home was at Redhill, was a Flying Instructor under the Empire air training scheme. Sailing in January last, his ship was lost with all on board. On behalf of this valiant young officer's colleagues in the veterinary profession, we extend deepest sympathy to the bereaved wife and small son, both now in Africa.

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R.C.V.S. OBITUARY

Hodgins, William Thomas George, Mountrath, Birpham Road, Park Royal, N.W.10. Graduated Edinburgh, December 20th, 1893. Died July 23rd, 1941, aged 70 years.

Baxter, John Richmond, Downington House, Lechlade, Glos. Graduated London, December 16th, 1901. Died July 23rd, 1941, aged 62 years.

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HIGH TEMPERATURE SHORT-TIME PASTEURISATION "RECOGNISED"

The Minister of Health, in a circular to local authorities, announcing the introduction of the Milk (Special Designations) Regulations, 1941, authorising the adoption of the above process, as an alternative to the "Holder" method, by pasteurisation licencees, states that representations have been made to him that for such reasons as shortage of skilled labour and of materials, difficulties are experienced in the circumstances of the present time in maintaining or replacing apparatus licensed under the Milk (Special Designations) Orders, 1936 and 1938, which provide only for the "Holder" process of pasteurisation. At the same time, it is particularly desirable, for the safety of the milk supply, that pasteurisation should as much as possible be encouraged.

The new Regulations accordingly, as an alternative to the "Holder" process, enable a licensing authority to grant a pasteuriser's licence in respect of a process of "High Temperature Short Time" pasteurisation, which, the Minister is advised, effectively destroys any disease-producing organisms in the milk, provided the apparatus is suitable and is worked with proper care. At the same time, the apparatus needed is much smaller and simpler than that required for the "Holder" method. It can be more easily worked, *e.g.*, it can be quickly started and stopped and readily cleaned, and it is understood that no difficulty is ordinarily to be anticipated in the maintenance and repair of the plant. In many cases "Holder" apparatus may be capable of adaptation.

The conditions for a pasteuriser's licence under this method are the same as the relevant conditions in the Orders of 1936 and 1938, except for the modifications made by the Second Schedule of the present Regulations. These more particularly provide that the milk shall be retained at a temperature of not less than 162° F. for at least 15 seconds, and that the apparatus for the process shall be provided with an automatic device to divert the flow of any milk which has not been so treated.

After stating that the "Holder" process remains as an alternative requiring to be separately licensed, the announcement proceeds: "In view of the importance of ensuring that the apparatus for pasteurisation is suitable, the Minister desires that Authorities will, before granting a pasteuriser's licence under the new Regulations, require the applicant to satisfy them fully as to the suitability of the apparatus, including a demonstration to their authorised officers by a trial run (for which water would be sufficient) that the apparatus works satisfactorily in accordance with the requirements of the Order. The Minister is advised that a local authority may, if they so desire, obtain advice with regard to apparatus which an applicant proposes to use, from the National Institute for Research in Dairying, Shinfield, near Reading.

"After a licence has been granted, inspections should be made of the working of the apparatus as frequently as circumstances permit, and periodical samples of the milk should be taken for examination by the prescribed plate count test. The Minister further desires to impress on authorities the importance of having samples also examined by the phosphatase test. As explained in paragraph 28 of Circular 1533 of April 24th, 1936, a positive result to this test is conclusive evidence that the milk has not been properly pasteurised, or that milk which has not been pasteurised has been added to it. The test, therefore, which can be quickly carried out, affords a valuable practical control.

"The Minister fully appreciates the heavy demands on Authorities and their staffs at the present time, but he trusts that in view of the importance of maintaining and if possible extending the pasteurisation of milk by adequate methods, he may have their full co-operation in carrying out the provisions of these Regulations."

* * * * *

ANIMAL DISEASE RESEARCH IN EIRE

The view that it would be an unnecessary hazard to undertake research into foot-and-mouth disease in Eiré is expressed in a statement issued on behalf of the Veterinary Medical Association of Ireland. It is pointed out that such research would entail maintaining this virulent disease within or close to the shores of the Free State, and that considerable research is already being conducted in other countries where ample facilities and experienced staffs are available for the purpose. "In short," the statement adds, "it is the opinion of the Association that the present policy of the Government is the only sane method of dealing with the disease in this country, and to attempt work of the nature suggested would be foolhardy in the extreme."

The Association is desirous of bringing to the notice of the public the urgency of research into other animal diseases which, unlike foot-and-mouth disease, are endemic and are responsible for considerable cost to the community. The immediate and spectacular effects of foot-and-mouth disease on the economy of the country

have justifiably aroused the public mind to a degree of interest and anxiety consonant with the position, but the public do not appear to be aware of the economic effects of some of the less spectacular but no less injurious plagues of Eiré's livestock. It has been estimated by the Association, for example, that the insidious diseases are responsible for an annual loss of between seven and eight million pounds a year in the country. "This huge loss in our chief industry is, it is suggested, a matter of grave national concern and requires immediate consideration.

"The Government of Northern Ireland have taken active steps to deal with this serious problem in their territory, and the results so far obtained have fully justified their enterprise. Surely this part of the country, containing as it does much more valuable livestock and from which most of our wealth arises, should not delay further in putting a reasonable project of veterinary research and disease eradication into effect."

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The experience of the last war showed that farmers, when deprived of their supplies of imported concentrates, tend to keep more animals than they can feed adequately from their own resources, in the hope that "something will turn up"—an exceptionally good grazing season, an extra ton of cake from their merchant, or a sudden armistice. One result is a highly seasonal variation in the output of meat; if cattle numbers had been reduced last winter there would have been more hay and ensilage made this summer; a large proportion of the survivors could have been carried into January and February, and the autumn glut of meat at the end of the grazing season would have been avoided.—*Economist.*

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Frank Mower, a farmer, who said that he thought he could slaughter his animals for pig food without permit, was ordered to pay a total of £1,220 in fines and costs at Chesterfield, Derbyshire.

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An Ayrshire farmer, who moved some of his sheep from the field across a road to his steading to be shorn, has been fined £20. He was contravening a Foot-and-Mouth Disease Order.

CORRESPONDENCE

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

The views expressed in letters addressed to the Editor represent the personal view of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

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"A PRACTITIONER'S COMPLAINT"

To the Editor of the Veterinary Record

Sir,—Commenting upon the letter of Mr. Shipley, in your issue of the 19th inst., Mr. G. S. Muir extends his sincere sympathy to Mr. Shipley in that his practice has been "blitzed" and largely destroyed by the Hun. We all of us offer our warmest sympathy to Mr. Shipley and all our other colleagues who have suffered similarly. But Mr. Muir withholds that sympathy when Mr. Shipley points out that, on top of these ravages by the alien enemy, his practice is now being further "blitzed" by raid after raid upon his animal health work by his own Government. One may ask, "Why?" Well, Mr. Muir, either by way of justification of the Government's actions, or by way of consolation to Mr. Shipley for having his "bread and butter" taken away, tells him and all the profession, that it is really a blessing in disguise to be deprived of this work, and the sustenance it brings, for in some sinister way, doing it is supposed to exert a malign influence. For, we are told, "if he allows Panel A work to become the major part of a general practice, *to the detriment of that practice,* it will be disastrous to the practice, and to the best interests of the profession." One must be allowed to ask, how Mr. Muir comes to *assume*—for assumption it is—that Mr. Shipley or any other L.V.I. neglects or "puts off" his other work in favour of his animal health work? Also, why should not this public health work form even the major part of every general practice? It may do some day, if and when the full programme of the Ministry for the control of tuberculosis, contagious abortion, mastitis, Johne's disease and the diseases of poultry, materialises. When that time comes, is the practitioner not the right man to do it by virtue of training and clinical experience; is it not his birthright "virtually earned by achievement through a great number of years," as Mr. Shipley remarks?

Mr. Muir fails to understand Mr. Shipley's contention that if the practitioner loses all State work, he will be left with only "the more disagreeable and least remunerative part of the practice." He quotes the disagreeable parts of the Ministry work: pig *post-mortem* examinations being "smelly" in summer, and "chilling" in winter, whilst the palpation of cows' udders for tuberculosis he finds only "soul destroying," forgetting perhaps that thereby he may save some child from contracting tuberculosis. I would like Mr. Muir to consider the following short list of work which would be left to the general practitioner by contrast—Foaling and calving cases, by day or night, with frequent embryotomies and stripped for hours on end; prolapses of the uterus, removals galore of "afterbirths," accident cases, castrating colts, suturing wounds, and all the rest of the rough-and-tumble jobs of a country practice. Are these not the "disagreeable, least remunerative," and, I would add, dirty and often dangerous jobs, by doing which he would be expected to live?

One may well ask why the main body of the profession in this country should meekly submit to be condemned for a lifetime to do only such work. Why should a member be excluded from doing other work which utilises his training in scientific theory, continues his interest in bacteriology, the use of the microscope, biological methods of testing, diagnosis, disease control, and all the rest of his heritage of modern science?

Again, Mr. Muir discovers another malign influence in the Ministry work in that, "dependence on a Government *subsidy* by practitioners, if persisted in, will certainly lead to a loss of independence, and a general lowering of efficiency." But, surely, Mr. Muir has here saddled the wrong horse; it is the farmer who is subsidised, not the veterinary surgeon, for the latter does full work for the pay he gets, and is not receiving a dole. If the Government considers it to be in the national interest to become the paymaster for the farmer, it is not the fault of the practitioner, and it is the farmer, if anybody, who is in danger of being pauperised, and of losing his independence. Carried to their logical conclusions, the contentions of Mr. Muir would seem to call for his resignation and that of every practitioner from all panel work, and the establishment of a full "totalitarian" service taking over all present and future animal health duties. If this happened, the profession would be divided into two sections, each in its separate water-tight compartment. Upon the one hand, the whole-time officers would run on the prescribed and narrow lines and technique concerning a certain number of diseases, but divorced from the wider fields of everyday clinical experience. Upon the other hand, the practitioner, cut off from the great fields of scientific preventive medicine and disease control, would quickly become a mere "hewer of wood and drawer of water," existing or starving on an emasculated general practice. Both sections would be heavy losers on the wider scientific sides of their profession, but the sacrifices would be by no means equal. For—let us note and remember—in addition the practitioner would be largely destroyed economically, whilst the sheltered State Officer goes on to enjoy a pension and, let us hope, a leisured old age. If any such evolution of the profession is contemplated, in full or in part, now or in the future, there is surely no practitioner who can afford to remain "neutral." Europe is littered with the ruins of kingdoms and their enslaved peoples who trusted in "neutrality"

when dictators stalked abroad. There is probably no form of our evolution which could be more disastrous to the profession as a whole, or "soul destroying" to its individual members. It would certainly, if allowed to succeed, be the negation of that contention to which the National Veterinary Association is pledged: "That the practitioner must be the first line of defence in all measures taken to combat the diseases of animals."

Yours faithfully,
E. P. Edwards.

"Rhianfa,"
Prestatyn, N. Wales.
July 25th, 1941.

. . . . . .

To the Editor of the Veterinary Record

Sir,—It has been stated in these columns that, whilst Panel A duties may be a useful *adjunct* to a practice, to allow them to become the *major part*, to the detriment of that practice, is inviting disaster.

Now this seems a very sweeping assertion to make in complete ignorance of the extent to which these duties formed part of that practice before they came under Government control.

The correspondent who is responsible for this utterance should remember that there is a growing tendency these days for more and more diseases to be placed under Government control, and there is no guarantee that, when they are, the duties entailed will be the perquisite of the general practitioner, as they are at present. Once duties are taken over by any Government department it should be obvious to anyone that it is not going to give out work to private individuals, when it has its own staff to do it.

He should, in view of this plain statement of fact—together with legislation which in the not-distant future may emanate not only from without but from within—not be so certain that in *normal times* (assuming that these have existed during the last few years, or are likely to return in our span of existence) there will always be plenty of work for the efficient practitioner in nearly all areas.

The root cause of not a few of our troubles is in no small measure a complete lack of a definite policy, and exponents who, from being "No-men" of an evening, become "Yes-men" overnight.

If future legislation is only to benefit a few and not the whole of the profession it has got to be opposed. That at any rate is the standpoint I am taking up and intend to pursue.

Yours faithfully,
J. F. D. Tutt.

"Rothiemurchus,"
St. Cross, Winchester.
July 25th, 1941.

. . . . . .

To the Editor of the Veterinary Record

Sir,—I think Mr. Shipley deserves the thanks of the profession for bringing his case forward and stating it in such moderate terms.

Few men who have not experience of practices by the sea are capable of judging the intracies and exigencies of carrying them on in normal times, let alone at present. The matter is more complicated now in those places (apart from "blitzing") where fishing seasons occur periodically.

Not many men are like Mr. Muir—apparently in love with the "hewing of wood and drawing of water" side of practice and perfectly content with its reward.

Yours sincerely,
G. Mayall.

Bolton,
July 26th, 1941.

DISEASES OF ANIMALS ACTS, 1894 TO 1937, AND AGRICULTURE ACT, 1937 (PART IV).

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period.	Anthrax.		Foot-and-Mouth Disease.		Parasitic§ Mange.		Sheep Scab.	Swine Fever.	
	Outbreaks confirmed.	Animals attacked.	Outbreaks confirmed.	Animals slaughtered as diseased or exposed to infection.	Outbreaks confirmed.	Animals attacked.	Outbreaks confirmed.	Outbreaks confirmed.	Swine slaughtered.
	No.	No.	No.	No.	No.	No.	No.	No.	No.
Period 16th to 30th June, 1941	9	22*	—	—	2	7	3	34	13
Corresponding period in ...									
1940	11	22	—	—	—	—	—	216	150
1939	29	35	6	396	1	4	5	155	106
1938	21	31	2	39	—	1	1	39	34
Total 1st January to 30th June 1941	274	316	255	26,439	10	32	134	795	374
Corresponding period in									
1940	281	318	19	2,853	14	27	115	2,111	1,406
1939	452	491	44	5,652	31	70	152	1,051	694
1938	481	533	155	19,940	42	70	103	300	216

Note.—The figures for the current year are approximate only. §Excluding outbreaks in Army Horses.
* Eleven of these animals refer to an outbreak confirmed prior to June 16th, 1941.

Tuberculosis (Attested Herds) Schemes

The number of Attested Herds, *i.e.*, herds officially certified as free from tuberculosis as at June 30th, 1941, was as follows:—England 3,908 ... Wales 9,237 ... Scotland 3,279 ... Total (Great Britain) 16,424